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Optimization of municipal energy strategies: Are community energy profiles the key to a higher implementation rate of renewable energies?

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It is at the local level where policies to increase the share of renewable energies and higher energy efficiency measures get implemented. Municipalities, as responsible entity for physical planning, can hold a key role in transforming our energy systems towards carbon-neutrality. The implementation has to be approached at community scale, rather than at building or city scale, which has many advantages.[1] Despite the promising efforts to approach this at community scale, the implementation of renewable energies is still too slow to meet global or just national GHG reduction goals.[2,3]

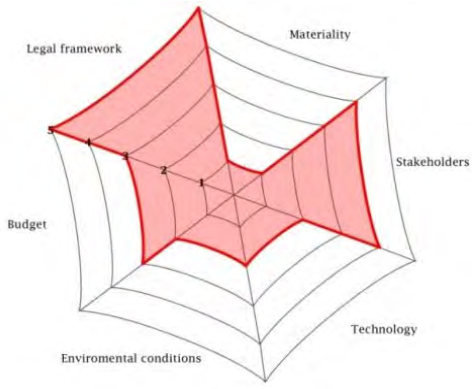

Fig. 1: Example of a CEP visualization

The study evaluates the current state of community energy planning in northern Europe via a review of literature and practice. Two major mismatches have been identified: First, community energy concepts and the available literature are too technical and rarely consider qualitative factors that are crucial for implementation of energy strategies. Thus, there is a general gap between literature, community energy concepts and the actual implementation process. Second, municipalities lack knowledge on energy planning; ensuing, a guideline on choosing adequate planning methodologies to implement technical concepts. As a reaction on the found barriers a decision-support methodology was developed: It should help municipalities in the pre-project phase to (A), identify possible energy technology strategies and assess their impact on the energy performance of the community and (B), connect the technical strategies with qualitative information on the community, allowing choosing adequate planning methodologies to implement the suggested energy strategies – community energy profiles (CEP). The CEPs enrich quantitative energy modelling, which too often produces techno-economic standard solutions, with qualitative information on the specific community via the identification of local socio-economic challenges. Besides enhancing community energy system modelling, communities in various local settings become comparable.

The basic function of the methodology can be described as a rough energy strategy feasibility analysis, with an addition of soft factors from the CEP to find the technology bundle that is most likely to be implemented and an advice about possible planning strategies to achieve this. The first application of the methodology enabled the municipality Elmshorn (Germany) to build-up a cost-efficient and low-carbon district heating.[4] The case showed the capacity as well as the potential for optimization of the methodology, which makes further development of the methodology into a decision-support tool necessary.

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